

## CLAIMS

What is claimed is:

1. A method for controlling a feel back torque of a motor,  
the method comprising:  
receiving a signal indicative of a difference between a desired  
motor position and an actual motor position;  
5 filtering the received signal into a plurality of frequency bands;  
and  
applying a gain to at least one of the filtered frequency bands in  
correspondence with at least one of the received signal and a low-pass portion  
of the received signal to provide a motor command.
2. A method as defined in Claim 1 wherein the motor is  
disposed relative to a differential.
3. A method as defined in Claim 2 wherein the motor and  
differential are comprised by an active steering system.
4. A method as defined in Claim 1 wherein said gain is  
variable.
5. A method as defined in Claim 1 wherein said gain is  
scheduled.
6. A controller for an active steering system, the controller  
comprising:  
a feel control algorithm for controlling a feel back torque to a  
driver;  
5 wherein at least one of a high-pass gain and a low-pass gain  
correspond to at least one of an error signal and the low-pass portion of the error  
signal.

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7. A controller as defined in Claim 6 wherein the at least one of a high-pass gain and a low-pass gain comprise a scheduling table indexed on the at least one of an error signal and the low-pass portion of the error signal.

8. A controller as defined in Claim 7 wherein said scheduling table is further indexed on at least one of a vehicle state estimate, an environment estimate, and a driver preference.

9. A controller as defined in Claim 6 wherein at least one of the high-pass gain and the low-pass gain is a non-linear function of the at least one of an error signal and the low-pass portion of the error signal.

10. A controller as defined in Claim 6 further comprising at least one absolute value function in signal communication with the at least one of a high-pass gain and a low-pass gain.

11. A controller as defined in Claim 6 further comprising a final output saturation check function in signal communication with the at least one of a high-pass gain and a low-pass gain.

12. A controller as defined in Claim 6 wherein the low-pass filter is a first-order filter.

13. A controller for an active steering system, the controller comprising:

means for receiving a signal indicative of a difference between a desired motor position and an actual motor position;

5 means for filtering the received signal into a plurality of frequency bands; and

means for applying a gain to at least one of the filtered frequency bands in correspondence with at least one of the received signal and a low-pass portion of the received signal to provide a motor command.

14. A method for actively controlling the steering of a motor vehicle, the method comprising:

receiving an operator input from an operator of the motor vehicle;

5 receiving a stability input indicative of the dynamic stability of the motor vehicle;

calculating a correction signal in accordance with the operator input and the stability input;

filtering the correction signal into a plurality of frequency bands;

10 applying a gain to at least one of the filtered bands to produce an output signal corresponding to a desired feel back torque; and

adjusting an input to a differential actuator in accordance with the output signal.

15. A method as defined in Claim 14 wherein said adjusting comprises:

providing the output signal to an electric motor disposed relative to the differential actuator in order to adjust a steering angle of a steering

5 actuator while maintaining desirable feel back torque characteristics.

16. An active steering system comprising:

an input device;

a differential actuator in operable communication with said input device;

5 a steering actuator in operable communication with said differential actuator; and

a feel controller in signal communication with said input device, said steering actuator, and said differential actuator for controlling a feel back torque to an operator.

17. An active steering system as defined in Claim 16, the differential actuator comprising:

- a motor in signal communication with said feel controller; and
  - a differential unit disposed relative to said motor, said input
- 5 device, and said steering actuator.

18. An active steering system as defined in Claim 17 wherein said differential unit is configured to provide a steering angle to said steering actuator that is substantially independent of an input from an operator.

19. An active steering system as defined in Claim 17 wherein said differential unit further comprises:

- an input gear axially affixed to a differential input shaft;
  - an output gear axially affixed to a differential output shaft;
- 5 a first spur gear meshingly engaged with said input gear and said output gear;
- a second spur gear meshingly engaged with said input gear and said output gear; and
  - a worm drive meshingly engaged with a worm gear, said worm
- 10 gear rotatingly receiving said differential input shaft therethrough.

20. An active steering system as defined in Claim 19 wherein said worm drive is disposed at an end of a motor shaft, said motor shaft being coupled to said motor.

21. An active steering system as defined in Claim 16 wherein said feel controller comprises a high-pass gain function and a low-pass gain function.

22. An active steering system as defined in Claim 16 wherein said feel controller comprises a low-pass filter for dividing a signal into a low-frequency component and a high-frequency component.

23. An active steering system as defined in Claim 22 wherein said feel controller further comprises a summing function for receiving the input of the low-pass filter and the output of the low-pass filter, and for providing an input to a high-pass gain function.

24. An active steering system as defined in Claim 16 further comprising an assist controller in signal communication with said steering actuator.

25. An active steering system as defined in Claim 24 wherein said feel controller is in signal communication with said assist controller for adjusting a variable assist.

26. An active steering system comprising:  
 means for receiving a steering input from an operator of the motor vehicle;  
 means for receiving a stability input indicative of the dynamic stability of the motor vehicle;  
 means for calculating a correction signal in accordance with the steering input and the stability input;  
 means for filtering the correction signal into a plurality of frequency bands;  
 means for applying a gain to at least one of the filtered bands to produce an output signal corresponding to a desired feel back torque; and  
 means for adjusting an input to a differential actuator in accordance with the output signal.

27. A motor controller, comprising:  
 a feel control algorithm for controlling a feel back torque to an operator;  
 wherein at least one of a high-pass gain and a low-pass gain correspond to at least one of an error signal and a low-pass portion of the error signal.